



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/784,772	02/24/2004	Moon-Sook Lee	8947-000075/US	8340
30593	7590	11/30/2006		
HARNESS, DICKEY & PIERCE, P.L.C. P.O. BOX 8910 RESTON, VA 20195				
			EXAMINER LUND, JEFFRIE ROBERT	
			ART UNIT 1763	PAPER NUMBER

DATE MAILED: 11/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/784,772

Applicant(s)

LEE ET AL.

Examiner

Jeffrie R. Lund

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 September 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-13,15-17 and 31-33 is/are pending in the application.
- 4a) Of the above claim(s) 31-33 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-13 and 15-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The substitute specification filed September 6, 2006 has been entered.
2. The abstract of the disclosure is objected to because it contains the indefinite term "heat pipe". Correction is required. See MPEP § 608.01(b). The Examiner recommends amending "heat pipe" to read --heating pipe-- as was done in the specification.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 2-10, 12, 13, 15-17, 20-30 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 13 and 17 are indefinite because the claims are directed to an apparatus and include limitations that are methods of using the apparatus (i.e. metal organic gas into the processing chamber (claim 13); or supplying oxygen, Pb source, Zr source, or Ti source (claim 17)). As a result of the combination of two separate statutory classes of invention, a manufacturer or seller of the claimed apparatus would not know from the claim whether it might also be liable for contributory infringement because a buyer or user of the apparatus later performs the claimed methods of using the apparatus. Thus, such a claim is not sufficiently precise to provide competitors with an accurate determination of the metes and bounds of protection involved. (See *IPXL Holdings LLC*

v. Amazon.com Inc. 77 USPQ2D 1140)

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1, 3-5, 8, 10-12, 16, and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Sakamoto et al, US Patent 5,968,593.

Sakamoto et al teaches an apparatus for fabricating a semiconductor device that includes: a process chamber 100; a susceptor (wafer 200 on boat 212) disposed within the process chamber; a shower part 32, 40, and 42 disposed to face the susceptor; a first supply pipe 91 for supplying a first gas; a second supply pipe 92 for supplying a second gas; a heating pipe 311 for heating the first gas; a second heating pipe 312 for heating a second gas; and a liner 10 between the heating pipe and the susceptor. The heating pipes are: connected with the supply pipes 91, 92 and the shower part 32, 40, 42; is inside the processing chamber 100; includes a helically coiled shaped part coiled around the circumference of the susceptor from the a lower portion of the sidewall to the upper portion of the sidewall of the process chamber; and is heated by radiation from the susceptor. The specific material deposited and process performed is an intended

Art Unit: 1763

use of the apparatus, and Sakamoto et al is capable of depositing a ferroelectric layer, or a layer containing Pb, Zr, or Ti and functioning as a MOCVD apparatus. (Entire document, specifically, figure 13)

7. Claims 1, 3, 10, and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Inokuchi et al, US Patent 6,139,641.

Inokuchi et al teaches an apparatus for fabricating a semiconductor device that includes: a process chamber 10; a susceptor 120 disposed within the process chamber; a shower part 28 disposed to face the susceptor; and a first supply pipe 44 for supplying a first gas; a heating pipe 42, 401, and 43 for heating the first gas. The heating pipe is: connected with the supply pipe and the shower part; includes a coiled shaped part 401 coiled around the circumference of the susceptor; a second linear part 42 connected to the gas inlet; and a third linear part 43 connected to the shower part. The specific material deposited is an intended use of the apparatus, and Inokuchi et al is capable of depositing a ferroelectric layer. (Entire document, specifically, the figures)

8. Claims 1 and 16 are rejected under 35 U.S.C. 102(e) as being anticipated by Shim et al, US Patent Application Publication 2003/0041804 A1.

Shim et al teaches an apparatus for fabricating a semiconductor device that includes: a process chamber 110; a susceptor 120 disposed within the process chamber; a shower part 135 disposed to face the susceptor; a first supply pipe (gas inlet) for supplying a first gas; and a heating pipe 130 for heating the first gas. The heating pipe is around the substrate, and heated by heat radiated from the substrate. The specific material deposited is an intended use of the apparatus, and Shim et al is

Art Unit: 1763

capable of depositing a ferroelectric layer. (Entire document, specifically, figure 2A, 2B)

Around was interpreted to mean near or in the general vicinity of.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 1 and 3-11, are rejected under 35 U.S.C. 103(a) as being unpatentable over Shim et al, US Patent Application Publication 2003/0041804 A1, in view of Sakamoto et al, US Patent 5,968,593.

Shim et al teaches an apparatus for fabricating a semiconductor device that includes: a process chamber 110; a susceptor 120 disposed within the process chamber; a shower part 135 disposed to face the susceptor; and a first supply pipe (gas inlet) for supplying a first gas; a heating pipe 130 for heating the first gas. The heating pipe is imbedded in the chamber wall or located inside the chamber wall, and heated by heat radiated from the susceptor. (Entire document, specifically, figure 2A, 2B)

Shim et al differs from the present invention in that Shim et al does not teach that the heating pipe coils in a helix or spiral coil along the bottom (second part), sidewall (first part), and top (third part) of the processing chamber; a liner between the susceptor and the heating pipe; or a second gas inlet.

Sakamoto et al was discussed above and includes a heating pipe along the sidewall and top of the processing chamber in the form of a helical and spiral coil, a liner

between the susceptor and heating pipe, and a second gas inlet.

The motivation for forming coils along the sides of the processing chamber is to extend the length of the heating pipe to extend the time in which the gas is preheated which results in the gas being heated to a more uniform temperature as taught by Sakamoto et al.

The motivation for adding the liner of Sakamoto et al between the susceptor and the gas inlet of Shim et al is to remove the heating pipe from the processing chamber environment as taught by Sakamoto et al.

The motivation for adding the second gas inlet of Sakamoto et al to the apparatus of Shim et al is to provide a second gas to the processing chamber.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made modify the apparatus of Shim et al to make the heating pipe with helical and spiral coils, add a liner, and a second gas inlet as taught by Sakamoto et al.

11. Claims 12, 13, and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shim et al, US Patent Application Publication 2003/0041804 A1, in view of Sakamoto et al, US Patent 5,968,593, as applied to claims 1 and 3-11 above, and further in view of Shinriki et al, US Patent 6,800,139 B1.

Shim et al and Sakamoto et al differ from the present invention in that they do not teach a MOCVD apparatus, the first gas is an oxygen gas supplied at room temperature, the second gas is a heated metal organic gas containing Pb, Zr and Ti for depositing a ferroelectric layer, or that the first gas flows into a first part of the shower

Art Unit: 1763

and the second gas flows into a second part of the shower, separated from the first part.

Shinriki et al teaches an MOCVD apparatus for depositing a PZT ferroelectric layer that includes: a shower part 50; a first supply pipe 80 for supplying an oxygen gas (NO_2) at room temperature to a first shower part 58A-58C; a second gas supply pipe 62, 66 for supplying a heated metal organic gas containing Pb, Zr and Ti (column 7 lines 29-46) to a second part 56A, 56B, not connected to the first part. (Entire document, specifically, figures 1 and 3)

The motivation for replacing the gas sources and shower of Shim et al and Sakamoto et al with the gas sources with heated gas line and shower of Shinriki et al is to enable the apparatus of Shim et al and Sakamoto et al to deposit a PZT ferroelectric layer as taught by Shinriki et al.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the gas sources and shower of Shim et al and Sakamoto et al with the gas sources with headed gas line and shower of Shinriki et al.

12. Claims 12, 13, and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakamoto et al, US Patent 5,968,593, in view of Shinriki et al, US Patent 6,800,139 B1.

Sakamoto et al was discussed above.

Sakamoto et al differs from the present invention in that Sakamoto et al does not expressly teach a MOCVD apparatus, the first gas is an oxygen gas supplied at room temperature, and the second gas is a heated metal organic gas containing Pb, Zr and Ti for depositing a ferroelectric layer; or teach that the first gas flows into a first part of the

Art Unit: 1763

shower and the second gas flows into a second part of the shower, separated from the first part.

Shinriki et al teaches an MOCVD apparatus for depositing a PZT ferroelectric layer that includes: a shower part 50; a first supply pipe 80 for supplying an oxygen gas (NO_2) at room temperature to a first shower part 58A-58C; a second gas supply pipe 62, 66 for supplying a heated metal organic gas containing Pb, Zr and Ti (column 7 lines 29-46) to a second part 56A, 56B, not connected to the first part. (Entire document, specifically, figures 1 and 3)

The motivation for replacing the gas sources and shower of Sakamoto et al with the gas sources with heated gas line and shower of Shinriki et al is to enable the apparatus of Sakamoto et al to deposit a PZT ferroelectric layer as taught by Shinriki et al.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the gas sources and shower of and Sakamoto et al with the gas sources with headed gas line and shower of Shinriki et al.

Response to Arguments

13. Applicant's arguments, see page 9, filed September 6, 2006, with respect to the 112 second paragraph rejection of claims 12, 13, 16, and 17 have been fully considered and are persuasive. The 112 second paragraph rejection of claims 12 and 16 has been withdrawn.

14. Applicant did not argue the 102 rejections under Vaartstra et al, Derderian et al, or Shinriki et al. These rejections have been dropped because the heating pipes are

Art Unit: 1763

located outside of the processing chamber, which neither around nor near the susceptor and prevents the heating pipes from being heated by heat radiated from the susceptor.

15. Applicant's arguments filed September 6, 2006 have been fully considered but they are not persuasive.

In regard to the arguments directed to the restriction requirement, the Examiner disagrees. The issue was fully addressed and is FINAL, as noted in the Office Action mailed June 6, 2006.

In regard to the argument:

Example non-limiting embodiments of this feature are discussed, for example, in paragraph [0049] and FIG. 2 of the instant specification. Sakamoto, as relied upon by the Examiner, fails to anticipate or suggest a heating pipe that has one end connected with the first supply pipe, the other end connected with the shower part, and the heating pipe passing around the susceptor as recited in independent claim 1.

On p. 7 of the Office Action, the Examiner states that reference numeral 311 in FIG. 13 corresponds to the heating pipe in independent claim 1. However, in column 10, rows 33-35, Sakamoto uses reference numeral 311 to describe gas feeding pipes, which appear to correspond with gas supply pipes 242 and 244 in FIG. 2 of the instant application. Also, Applicants can find no reference to the gas feeding pipes also serving as heating pipes.

Even if the gas feeding pipes served as heating pipes (which Applicants do not admit), in FIG. 2 of the instant application, the heating pipe 250 and the gas supply pipes 242 and 244 are clearly two different pipes serving two different functions.

The Applicants, therefore, respectfully request that the rejection to Claim 1 under 35 U.S.C. § 102(b) be withdrawn.

In addition, independent claim 1 recites the first source gas flowing through the heating pipe heated by heat radiated from the susceptor. In column 8, lines 55-60, Sakamoto states that the gas is heated by the gas distribution chamber. Sakamoto further states that "gas supplied from the gas supply tube is preheated before it is led into the gas feed pipes". Therefore, the source gas in Sakamoto is not "heated by heat radiated from the susceptor" as in independent claim 1.

The Examiner disagrees. Sakamoto et al teaches gas supply pipes 91, and 92 attached to a gas inlet 321, 322. The gas inlets are attached to "gas supply pipes" 311, 312 which act as heating pipes. Sakamoto et al describes the effect of the pipes 311, 312 as: "Since the gas feed pipes 311 and 312 are spirally wound around the reaction tube body 10, the effect of cooling by gas flowing through the gas feed pipes 311 and

Art Unit: 1763

312 can be dispersed." (Column 10 lines 40-43) In other words, the gases flowing through the pipe 311 and 312 is cooler than the reaction body tube. Thus heat flows from the reaction body tube to the pipes causing the tube near the pipes to cool, and the gas inside the pipes to be heated. By wrapping the pipes spirally around the reaction tube body the temperature drop is made more uniform and the gas is heated to a higher temperature. The reaction body tube is heated by heat radiated from the susceptor.

In regard to the argument:

As is clear from FIG. 6 of Inokuchi, gas supply tube 44 and opening 32 (which Examiner refers to as a showerhead) are located on the same area of the heating tubes 42 and 43. Therefore, Inokuchi fails to suggest a heating pipe with one end connected to a first supply pipe and the other end connected to a shower part.

The Examiner disagrees. Figures 2 and 4 clearly show that gas supply tube 44 is attached to heating tubes 42 which is attached to heating tube part 401, which is attached to heating tube 43, which is attached to the shower part 28. Gas flows from the gas supply tube through the heating tubes to the shower part.

FIG. 2

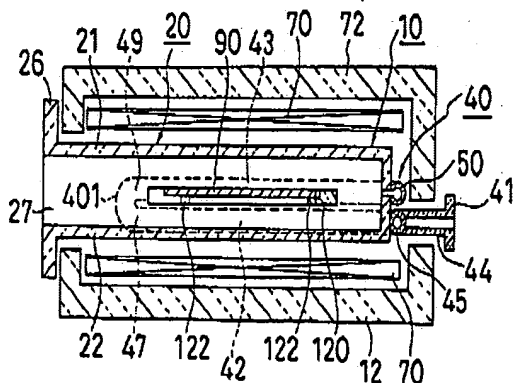
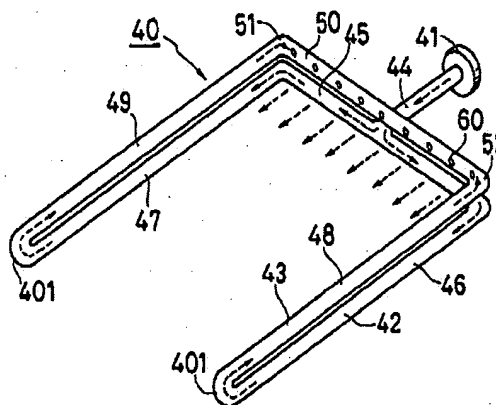


FIG. 7



Art Unit: 1763

In regard to the argument:

In addition, independent claim 1 recites the first source gas flowing through the heating pipe heated by heat radiated from the susceptor. In column 4, lines 46-49 and 64-66, Inokuchi states that the gas is heated by heater 70, which does not correspond with the susceptor of independent claim 1. Therefore, the source gas in Inokuchi is not "heated by heat radiated from the susceptor" as in independent claim 1.

The Examiner disagrees. The open (comprising) language of the claim does not limit the number of heat sources. The susceptor is also heated to by the heater 70 and also radiates heat that heats the gas heating tube.

The arguments directed to the 103 rejection are based on the arguments directed to Sakamoto et al. These arguments have been addressed above.

Conclusion

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.


17. Any inquiry concerning this communication or earlier communications from the

Art Unit: 1763

examiner should be directed to Jeffrie R. Lund whose telephone number is (571) 272-1437. The examiner can normally be reached on Monday-Thursday (6:30 am-6:00pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


Jeffrie R. Lund
Primary Examiner
Art Unit 1763

JRL
11/24/06